Gunter, Jason

From: Seabourne, Rocky <rseabourne@doerun.com>
Sent: Friday, January 15, 2016 9:33 AM
To: 'brandon.wiles@dnr.mo.gov'; Gunter, Jason; 'martin.kator@dnr.mo.gov'; Montgomery, Michael; Neaville, Chris; Ty Morris; Yingling, Mark
Subject: Emailing: Federal Monthly Progress report Dec.
Attachments: Attached Image; 11 - Remediation Air Report - November 2015.pdf

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Federal Monthly Progress report Dec.

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Monthly Ambient Air Monitoring Report

The Doe Run Company
Old Lead Belt Sites:
Federal, Rivermines, National, and Leadwood

November-2015

THE DOE RUN COMPANY
150 YEARS

SUITE 300
1801 PARK 270 DRIVE
ST. LOUIS, MO 63146

Federal Site

Sample Results for **November-2015**

	St. Joe (Ballfields)		Big River#4		Water Treatment Plant	
Sample Date	**TSP** ug/m3	**Lead** ug/m3	**TSP** ug/m3	**Lead** ug/m3	**TSP** ug/m3	**Lead** ug/m3
11/2/15	9	0.007	9	0.007	invalid	invalid
11/3/15	9	0.007	17	0.013	invalid	invalid
11/4/15	10	0.007	5	0.007	invalid	invalid
11/5/15	9	0.000	9	0.000	invalid	invalid
11/6/15	11	0.007	11	0.007	10	0.007
11/9/15	24	0.020	32	0.013	20	0.020
11/10/15	30	0.007	19	0.013	15	0.007
11/11/15	19	0.014	21	0.007	26	0.028
11/12/15	18	0.014	14	0.007	invalid	invalid
11/13/15	13	0.007	13	0.007	invalid	invalid
11/16/15	9	0.000	7	0.000	7	0.000
11/17/15	9	0.000	7	0.000	5	0.000
11/18/15	11	0.007	9	0.000	13	0.007
11/19/15	12	0.014	11	0.007	15	0.027
11/20/15	8	0.007	7	0.006	7	0.007
11/23/15	13	0.013	12	0.007	17	0.027
11/24/15	15	0.007	-1	0.000	12	0.007
11/25/15	25	0.027	16	0.007	14	0.007
11/30/15	5	0.007	10	0.000	3	0.000

Monthly Avg. TSP	14	12	13
Monthly Avg. Pb	0.009	0.006	0.011
Oct-15	0.012	0.008	0.035
Sep-15	0.011	0.014	0.012
Rolling 3-Month	**0.011**	**0.009**	**0.019**

Three month rolling average must be less than 0.15 ug/m3

	Big River QA	
Sample Date	**TSP** ug/m3	**Lead** ug/m3
11/3/15	8	0.007
11/5/15	7	0.007
11/10/15	19	0.013
11/12/15	14	0.007
11/17/15	6	0.000
11/19/15	10	0.006
11/24/15	16	0.006
11/26/15	17	0.007

Notes

11/2 thru 11/5, WTP electrical service off for upgrades.

11/12, 11/13, WTP, <23hr run time.

Rivermines

Sample Results for **November-2015**

	Big River #4		Rivermines South #1		Rivermines North #2		Rivermines East #3	
	TSP	**Lead**	**TSP**	**Lead**	**TSP**	**Lead**	**TSP**	**Lead**
Sample Date	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
11/2/15	9	0.007	12	0.013	14	0.013	invalid	invalid
11/3/15	17	0.013	19	0.027	11	0.013	invalid	invalid
11/4/15	5	0.007	9	0.007	7	0.007	invalid	invalid
11/5/15	9	0.000	15	0.027	9	0.000	invalid	invalid
11/6/15	11	0.007	22	0.033	9	0.007	10	0.007
11/9/15	32	0.013	33	0.052	20	0.006	20	0.020
11/10/15	19	0.013	18	0.007	15	0.013	15	0.007
11/11/15	21	0.007	26	0.007	23	0.021	26	0.028
11/12/15	14	0.007	23	0.014	13	0.000	invalid	invalid
11/13/15	13	0.007	25	0.019	10	0.006	invalid	invalid
11/16/15	7	0.000	10	0.000	8	0.000	7	0.000
11/17/15	7	0.000	9	0.000	6	0.000	5	0.000
11/18/15	9	0.000	14	0.007	3	0.000	13	0.007
11/19/15	11	0.007	19	0.026	14	0.000	15	0.027
11/20/15	7	0.006	9	0.006	7	0.007	7	0.007
11/23/15	12	0.007	19	0.020	15	0.027	17	0.027
11/24/15	-1	0.000	16	0.007	13	0.019	12	0.007
11/25/15	16	0.007	15	0.007	24	0.151	14	0.007
11/30/15	10	0.000	8	0.000	4	0.046	3	0.000

Monthly Avg. TSP	12	17	12	13
Monthly Avg. Pb	0.006	0.015	0.018	0.011
Oct-15	0.008	0.099	0.023	0.035
Aug-15	0.012	0.068	0.012	0.021
Rolling 3-Month	**0.008**	**0.061**	**0.018**	**0.022**

Three month rolling average must be less than 0.15 ug/m3

	Big River QA	
	TSP	**Lead**
Sample Date	ug/m3	ug/m3
11/3/15	8	0.007
11/5/15	7	0.007
11/10/15	19	0.013
11/12/15	14	0.007
11/17/15	6	0.000
11/19/15	10	0.006
11/24/15	16	0.006
11/26/15	17	0.007

Notes

11/2 thru 11/5, WTP electrical service off for upgrades.

11/12, 11/13, WTP, <23hr run time.

Federal Site

Sample Results for **November-2015**

	St. Joe (Ballfields)	Big River#4	Water Treatment
Sample Date	**PM10** (ug/m3)	**PM10** (ug/m3)	**PM10** (ug/m3)
11/2/15	11	10	invalid
11/5/15	11	9	invalid
11/8/15	20	27	17
11/11/15	14	14	16
11/14/15	10	8	19
11/17/15	9	29	9
11/20/15	6	3	5
11/23/15	11	1	9

Compliance with NAAQS is less than 150 ug/m3

Monthly Avg. PM10	11	13	13

	Big River QA
Sample Date	**PM10** (ug/m3)
11/2/15	14
11/8/15	24
11/14/15	10
11/20/15	3
11/26/15	5

Notes:

11/2 thru 11/5
Water Treatment Plant (Rivermines East #3) power off for utillitiy company service upgrade.

Rivermines

Sample Results for **November-2015**

Sample Date	Big River #4 **PM10** (ug/m3)	Rivermines South #1 **PM10** (ug/m3)	Rivermines North #2 **PM10** (ug/m3)	Rivermines East #3 **PM10** (ug/m3)
11/2/15	10	11	14	invalid
11/5/15	9	13	9	invalid
11/8/15	27	22	16	17
11/11/15	14	11	15	16
11/14/15	8	11	8	19
11/17/15	29	8	6	9
11/20/15	3	9	5	5
11/23/15	1	13	12	9

Compliance with NAAQS is less than 150 ug/m3

Monthly Avg. PM10	13	12	11	13

Sample Date	Big River QA **PM10** (ug/m3)
11/2/15	14
11/8/15	24
11/14/15	10
11/20/15	3
11/26/15	5

Notes:

11/2 thru 11/5
Water Treatment Plant (Rivermines East #3) power off for utillitiy company service upgrade.

Meterological Data - Old Lead Belt
November-2015

24hr average

Date	Wind Speed (MPH)	Wind Direction	Sigma-Theta	Temperature (C)	Air Pressure (mmHg)	Rain (Inches)	Power Supply (Volts)
01-Nov-15	2	204	26.68	12.4	744	0.00	13.44
02-Nov-15	2	118	26.73	10.1	745	0.00	13.49
03-Nov-15	3	154	25.35	14.5	747	0.00	13.41
04-Nov-15	3	196	19.73	16.9	748	0.00	13.39
05-Nov-15	6	194	17.8	18.0	744	0.91	13.37
06-Nov-15	4	292	18.63	12.6	747	0.01	13.38
07-Nov-15	3	267	20.77	7.2	753	0.00	13.5
08-Nov-15	2	170	25.67	4.6	754	0.00	13.55
09-Nov-15	2	225	27.02	4.6	749	0.00	13.57
10-Nov-15	3	191	22.91	9.5	746	0.00	13.53
11-Nov-15	9	200	18.93	15.8	739	0.25	13.42
12-Nov-15	7	276	19.97	10.1	744	0.00	13.48
13-Nov-15	4	259	18.35	6.8	752	0.00	13.54
14-Nov-15	4	222	16.39	9.4	753	0.00	13.52
15-Nov-15	4	195	18.77	9.9	752	0.00	13.52
16-Nov-15	6	175	21.08	10.7	746	0.86	13.51
17-Nov-15	9	163	23.06	16.6	737	3.00	13.41
18-Nov-15	9	211	16.74	13.1	736	0.01	13.43
19-Nov-15	4	276	18.76	7.8	748	0.00	13.52
20-Nov-15	5	165	22.74	6.1	749	0.00	13.58
21-Nov-15	7	303	18.57	2.7	748	0.24	13.63
22-Nov-15	3	211	18.06	-0.5	750	0.00	13.73
23-Nov-15	3	243	16.48	5.9	749	0.00	13.61
24-Nov-15	4	184	15	7.7	750	0.00	13.58
25-Nov-15	8	187	18.42	11.1	750	0.00	13.53
26-Nov-15	10	189	18.14	15.6	752	0.00	13.43
27-Nov-15	7	311	16.95	10.8	751	1.39	13.47
28-Nov-15	6	9	17.31	3.3	752	0.30	13.62
29-Nov-15	4	17	16.1	3.7	750	0.39	13.64
30-Nov-15	2	153	17.93	6.2	745	0.03	13.61

INQUEST
ENVIRONMENTAL INC.

3609 Mojave Ct., Ste E ◆ COLUMBIA, MO 65202
(573) 474-8110 ◆ FAX: (573) 474-8371

December 21, 2015

Mr. Greg Henson
Chemist
The Doe Run Company
881 Main Street
Herculaneum, Missouri 63048

RE: Park Hill Monitoring Network 4th Quarter 2015 Lead/PM10 Samplers Performance Audit Report.

Dear Mr. Henson,

Please find enclosed the worksheets detailing the Lead/PM10 sampler's one-point flow verifications that were recently performed on the Doe Run Park Hills Monitoring Network. A copy of the current certifications for the audit devices that were used has also been enclosed.

All of the verifications checks were found to be within guidelines.

After reviewing the enclosed information, please feel free to call with any comments or questions. Thank you for your business.

Sincerely,

John A. Kunkel
Inquest Environmental, Inc.

PM10 Sampler Verifications

INQUEST
Environmental, Inc.

PM10 Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Big River	Intercept (Qa)	-0.00876
Sampler	#4 QA PM10	Temperature	13.3 °C / 286.5 °K
Flow Controller	P1019	Station Pressure	30.15 "Hg / 765.8 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.30	1.076	24.80	46.32	0.940	1.131	**5.11**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Design % Difference	Acceptable Range
24.90	46.50	0.939	1.130	1.072	**-5.13**	± 10%

Calculations:

Pressure mmHg (Pf) - ("H_2O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.

PM10 Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	St Joe Park	Intercept (Qa)	-0.00876
Sampler	#4 PM10	Temperature	13.3 °C / 286.5 °K
Flow Controller	P4353	Station Pressure	30.15 "Hg / 765.8 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.20	1.060	23.80	44.45	0.942	1.109	**4.62**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Design % Difference	Acceptable Range
23.80	44.45	0.942	1.109	1.058	**-6.37**	± 10%

Calculations:

Pressure mmHg (Pf) - ("H_2O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.

PM10 Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel		
Operator	The Doe Run Company	Transfer Orifice	1882		
Location	Park Hills Network	Slope (Qa)	1.04094		
Station	Rivermines (Wtr Plnt)	Intercept (Qa)	-0.00876		
Sampler	#3 PM10	Temperature	16.4 °C	289.6	°K
Flow Controller	P2951	Station Pressure	29.79 "Hg	756.7	mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.20	1.072	24.20	45.20	0.940	1.122	**4.66**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Design % Difference	Acceptable Range
24.20	45.20	0.940	1.122	1.070	**-5.31**	± 10%

Calculations:

Pressure mmHg (Pf) - ("H_2O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.

PM10 Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Quarry)	Intercept (Qa)	-0.00876
Sampler	#1 PM10	Temperature	16.4 °C / 289.6 °K
Flow Controller	P4601	Station Pressure	29.79 "Hg / 756.7 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.30	1.088	24.00	44.82	0.941	1.096	**0.74**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Design % Difference	Acceptable Range
24.00	44.82	0.941	1.096	1.088	**-3.72**	± 10%

Calculations:

Pressure mmHg (Pf) - ("H_2O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

INQUEST
Environmental, Inc.

PM10 Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Above Quarry)	Intercept (Qa)	-0.00876
Sampler	#2 PM10	Temperature	16.4 °C / 289.6 °K
Flow Controller	P4507	Station Pressure	29.79 "Hg / 756.7 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Flow Rate Percent Difference	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.30	1.088	24.40	45.57	0.940	1.114	**2.39**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Design % Difference	Acceptable Range
24.50	45.76	0.940	1.114	1.087	**-3.81**	± 10%

Calculations:

Pressure mmHg (Pf) - ("H_2O/13.6) * 25.4

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Flow Rate Percent Difference- (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Percent Difference)/100)

Design Percent Difference- (Corrected Flow Rate-1.13)/1.13*100

Lead/TSP Sampler Verifications

INQUEST
Environmental, Inc.

Lead Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Big River Primary	Intercept (Qa)	-0.00876
Sampler	#4 TSP	Temperature	13.3 °C / 286.5 °K
Flow Controller	P4557	Station Pressure	30.15 "Hg / 765.8 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.70	1.139	25.40	47.46	0.938	1.207	**5.97**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Acceptable Range
25.00	46.71	0.939	1.222	**1.149**	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H_2O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.

Lead Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	St Joe Park	Intercept (Qa)	-0.00876
Sampler	#4 TSP	Temperature	13.3 °C / 286.5 °K
Flow Controller	P6792	Station Pressure	30.15 "Hg / 765.8 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.70	1.139	22.40	41.85	0.945	1.208	**6.06**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Acceptable Range
22.20	41.48	0.946	1.210	**1.137**	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H_2O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.

Lead Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Water Plant)	Intercept (Qa)	-0.00876
Sampler	TSP	Temperature	16.4 °C / 289.6 °K
Flow Controller	P4475	Station Pressure	29.79 "Hg / 756.7 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.80	1.167	21.40	39.98	0.947	1.205	**3.26**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Acceptable Range
21.30	39.80	0.947	1.205	**1.166**	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H_2O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.

Lead Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (Quarry)	Intercept (Qa)	-0.00876
Sampler	#1 TSP	Temperature	16.4 °C / 289.6 °K
Flow Controller	P2940	Station Pressure	29.79 "Hg / 756.7 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.80	1.167	22.50	42.04	0.944	1.213	**3.94**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Acceptable Range
22.70	42.41	0.944	1.213	**1.165**	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H_2O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

INQUEST
Environmental, Inc.

Lead Sampler Audit
Volumetric Flow Control

3609 Mojave Court, Suite E
Columbia, Missouri 65202
573-474-8110

Date	December 16, 2015	Auditor	John Kunkel
Operator	The Doe Run Company	Transfer Orifice	1882
Location	Park Hills Network	Slope (Qa)	1.04094
Station	Rivermines (above quarry)	Intercept (Qa)	-0.00876
Sampler	#1 TSP	Temperature	16.4 °C / 289.6 °K
Flow Controller	P2941	Station Pressure	29.79 "Hg / 756.7 mmHg

Flow Rate Audit

Transfer Orifice		Sampler				Calibration Error %	Acceptable Range
Manometer "H_2O	Flow Rate m^3/min	Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min		
3.70	1.152	21.80	40.73	0.946	1.217	**5.64**	± 7%

Sampler Operating Flow Rate

Manometer "H_2O	Pressure (Pf)	Press. Ratio (Po/Pa)	Flow Rate m^3/min	Corrected Flow Rate	Acceptable Range
21.90	40.92	0.946	1.217	**1.148**	1.10 - 1.70

Calculations:

Pressure mmHg (Pf) - "H_2O * 1.86832

Pressure Ratio (Po/Pa) - 1-Pf/Pa

Orifice Flow Rate (Qa) - 1/Slope*(Sqrt("H2O*(Ta/Pa))-Intercept)

Sampler Flow Rate (Qa) - Taken from the look-up tables

Calibration Error - (Sampler Flow-Orifice Flow)/Orifice Flow*100

Corrected Flow Rate - Operating Flow*((100-Calibration Error)/100)

Calibration Orifice Certification Worksheet

TISCH Environmental

TISCH ENVIRONMENTAL, INC.
145 SOUTH MIAMI AVE
VILLAGE OF CLEVES, OH
45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5028A

Date - Jan 13, 2015 Rootsmeter S/N 9833620 Ta (K) - 292
Operator Tisch Orifice I.D. - 1882 Pa (mm) - 765.81

PLATE OR VDC #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3360	4.3	1.50
2	NA	NA	1.00	1.0560	6.8	2.50
3	NA	NA	1.00	0.9570	8.2	3.00
4	NA	NA	1.00	0.8870	9.5	3.50
5	NA	NA	1.00	0.6670	16.5	6.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0225	0.7654	1.2420		0.9943	0.7443	0.7563
1.0191	0.9651	1.6034		0.9910	0.9385	0.9763
1.0173	1.0630	1.7564		0.9892	1.0337	1.0695
1.0155	1.1449	1.8972		0.9875	1.1133	1.1552
1.0061	1.5084	2.4840		0.9784	1.4668	1.5125
Qstd slope (m) =		1.66236		Qa slope (m) =		1.04094
intercept (b) =		-0.01438		intercept (b) =		-0.00676
coefficient (r) =		0.99927		coefficient (r) =		0.99927
y axis = SQRT[H2O(Pa/760)(298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

THE DOE RUN COMPANY

Remediation Group

Rock Seabourne
General Supervisor Land and Remediation
rseabourne@doerun.com

January 10, 2016

Mr. Jason Gunter
Remedial Project Manager
U.S. Environmental Protection Agency
Region 7 - Superfund Branch
11201 Renner Blvd.
Lenexa, KS 66219

Re: The Doe Run Company – Federal Mine Tailings Site Monthly Progress Report

Dear Mr. Gunter:

As required by Article XVII, Paragraph 73 of the Administrative Order on Consent (Docket No.VII-97-F-0009) for the referenced project and on behalf of The Doe Run Company, the progress report for the period December 1, 2015 through December 31, 2015 is enclosed. If you have any questions or comments, please call me at 573-244-8136.

Sincerely,

Rocky Seabourne
General Supervisor Land and Remediation

Enclosure
c: Mark Yingling – TDRC (electronic only)
Chris Neaville – TDRC (electronic only)
Michael Montgomery – TDRC (electronic only)
Martin Kator – MDNR DSP
Brandon Wiles – MDNR HWP
Ty Morris – Barr Engineering

35 Iron County Rd. #1, Viburnum, MO 65566
Telephone: (573) 244-8136

Federal Mine Tailings Site
Park Hills, Missouri
Monthly Progress Report
Period: December 1, 2015 – December 31, 2015

1. **Actions Performed or Completed This Period:**
   a. Work continued on the development of the Removal Action Report.
   b. Work continued on design modifications to address the erosion issues in the Shaw Branch Creek Area and Former Chat Pile Area.
   c. Work continued on the design of two additional dry ponds, one in the southern ORV Area and one between the Borrow Area and ORV Area.

2. **Data and Results Received This Period:**
   a. During this period, the ambient air monitoring samples for November were processed and the Ambient Air Monitoring Report for November 2015 was completed and is attached.

3. **Planned Activities for Next Period:**
   a. Address any comments received from MDNR-DSP to the Post-Removal Site Control Plan for the site.
   b. Continue developing the Removal Action Report.
   c. Continue the development of the design modifications to address the erosion issues in the Shaw Branch Creek Area and Former Chat Pile Area.
   d. Continue the design of the additional two dry ponds.

4. **Changes in Personnel:**
   a. None.

5. **Issues or Problems Encountered and the Resolution:**
   a. None.